

Identifying New Science Opportunities in Biogeochemistry for DOE Sites

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1. There are perhaps 5 major remediation projects going on at the SRS. Most of them are relating to TCE/PCE plumes. Two are related to metals/rads. One related to metals/rads is in a wetland (TNX or T-Area) and they will be adding apatite for immobilization of U and Pb and controlling water movement. In the second, F-Area (Pu, Cs, Sr, tritium), they are adding caustic to the subsurface to cause precipitation of metals and increase the cation exchange capacity of the natural sediments. Other sites, they simply place a water-barrier (clay barrier) over the metal/rad contaminated sites with clay liners, walk away, and monitor.
2. The prime remediation contractor is Bechtel and their subcontractors.
3. Tritium, TCE/PCE for Environmental Management; For Solid Waste (those responsible for disposing of waste on site) Pu, tritium, I, Tc, Np.
4. Tritium, TCE/PCE; Pu, Cs, Sr. Most of the remediation work on the SRS is over. Although there is still a lot of compliance work (paper work, and groundwater monitoring) required. This is reflected in the number of staff in our Environmental Remediation group (Bechtel) being cut by 1/3 over the last 2 years. They have started on many of these problems and have at least initiated if not completed many of the remediation plans on the site. There are no dangerous sites on sites that don't have some form of active remediation; in some cases they have several forms of remediation. Many cases it's simply a matter of monitoring or some form of active participation in the remediation, albeit quite a bit less than start up, *e.g.*, Dynamic Underground Stripping, Pump and Treat, Six-Phase Heating, etc...
5. Two key scientific challenges for restoring SRS sites:
 - a. Understanding long-term rad/sediment interactions: Provide guidance for Monitored Natural Attenuation (please see comment #7). What are long-term interactions between rads/metals and sediment. DOE disposal sites are concerned about making statements about 1000s of years. Are there some processes that we are describing as steady –state that should be described through kinetic models. For example, the site has observed small amounts of Pu(IV) reoxidation to mobile Pu(V) in SRS subsurface before it is rapidly reduced again. Such valence cycling could have major implications to risk analysis.
 - b. I recognize this is outside ERSP's interest, but a primary scientific challenge for restoration of the SRS is understanding biogeochemistry of metal/rads in riparian zones. This is essential for remediation and also for "taking credit" for risk calculations to off site receptors. For example, ¹²⁹I concentrations in wetland in the F-Area are 2 orders of magnitude greater than they were in the source term.

6. Monitored Natural Attenuation has been recently added into every remediation decision on the site. The intent of this is to permit the Site to remediate a smaller “source.” Alternatively, the entire contaminated aquifer is treated as a “source.” The State uses different language, like Mixing Zone. There is no time or desire (as defined by risk to fail contracts) to look at anything but off-the-shelf technologies. I feel that there will always be a need to clean the source and perhaps invoke MNA, where appropriate, along the fringes of the plume.